NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

DRY HYDRANT

(each)
CODE 432

DEFINITION

A non-pressurized permanent pipe assembly installed into water source that permits the withdrawal of water by suction.

PURPOSE

- Provide available water source for fire suppression or other uses

CONDITIONS WHERE PRACTICE APPLIES

Where a dependable source of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

The facility can be constructed, operated, and maintained without polluting air or water resources.

DESIGN CRITERIA

General. All planned work shall comply with federal, state, and local laws and regulations.

Site Conditions. Site conditions shall be such that an all weather vehicle access is available to the dry hydrant or can be developed. The dry hydrant shall be reasonably close to the water source to minimize the length of suction line. This should be determined in conjunction with local fire officials. Special care and maintenance will be required when debris and fine soil particles are part of the streambed or impoundment.

Water Requirement. The quantity to be considered available to a dry hydrant is the minimum available (at not over 15 feet total static lift) during the design drought. A minimum of 30,000 gallons (1.1 acre-inches) of pumpable impoundment water or a minimum pump flow rate of 250 gallons per minute (gpm) without interruption for 2 hours is considered the minimum for a dependable water supply.

Location. A location map showing the exact site of the hydrant and vehicle access shall be furnished to the local fire department with a copy to the landowner. A letter of approval to use the site shall be obtained from the landowner prior to construction. Access, topography, and location should be reviewed by fire department personnel prior to installation. The fire truck connection shall be within 10 feet of the edge of an all weather access road. The all weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance to Missouri Standard Drawing 29-L-403 sheet 3a and 3b of 3, Design Worksheet for pond or lakes. The water available from ponds and lakes is based on the drought of record. The drought of record is computed for the driest four month period (June through September) that has occurred from 1930 to 1990. Equivalent methods of computing available water, as approved by local fire protection districts, are permissible.

The NRCS state hydraulic engineer will determine the adequacy of streamflow

sources from regional analysis of stream gage data.

Pipe. The pipe material may be PVC pipe conforming to ASTM D1785, ASTM D2241, or AWWA C900.

Pipe shall be equivalent to Schedule 40 or SDR-26 or heavier. PVC pipe equivalent in strength to Schedule 40 is adequate for up to 14 feet of earthfill cover over the pipe. Exposed portions of pipe shall be painted to protect from exposure to sunlight.

Welded steel pipe conforming to ASTM A53 (standard weight) may be used. Steel pipe joints shall be thoroughly welded and strapped as needed. All steel pipe joints shall be watertight after installation.

No more than two 90-degree elbows shall be used in the entire pipe assembly. Pipe shall be 6 inches nominal diameter or larger. The pipe shall be fitted with intake screen or strainer and standard fire truck hose adapters for quick connect/release operations acceptable to the local fire department.

Pipe supports. If pipe supports are required, they shall be as shown on the drawings or as otherwise approved by the engineer.

Freeze protection. The pipe shall be installed in a manner that normal water level in the pipe is protected from freezing. This may be accomplished by including insulating sleeves or by soil cover equivalent to frost depth. Frost depths are shown in Figure 3.6 of the Missouri Livestock Watering Systems Handbook. Some installations may require compacted backfill mounded around the pipe.

Pipe intake. The pipe intake depth shall be calculated from the low water elevation plus pipe diameter plus 2 feet.

A dry hydrant installation shall provide for a positive slope toward the water source. In pits or impoundments, the intake screen or

strainer shall be supported and secured at least 2 feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.

To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2 feet below the low water level unless a special design is prepared to prevent a vortex.

Pump lift. The top of the fire truck pumping connection or centerline of pump (whichever is higher) shall have a static lift of no more than 15 feet in elevation above the top of the pipe intake. The system shall not contain more than 20 feet of empty pipe, i.e., pipe that is not full of water. Design considerations such as static pump lift and length of empty pipe shall be as stated in this standard unless otherwise approved by the local fire department.

The fire truck connection shall be approximately 24 inches above the ground surface, but never higher than the intake of the using fire truck.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled. Pumping head for each site shall include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or friction loss in flexible suction hose to the fire truck.

Dry hydrant. Dry barrel (conventional) hydrants may not be used due to excess suction loss and the necessity that they be absolutely airtight.

Foundation preparation shall consist of removal and disposal of soil and other material that is not adequate to support the design loads.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs, such as in a high vandalism area or for low profile and esthetic needs. It is also referred to as a flush mount hydrant and does not require the 24 inch riser. It may be used with the 45^{o} or straight dry hydrant head assembly.

Dry hydrant head. The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal.

Sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stain-less steel bolts.

Contact the local fire protection district to make sure head is compatible with their equipment.

The hydrant head shall be able to accept a 6 inch NST (National Standard Thread) connection to provide maximum supply. The NHT (American National Fire Hose Thread) is the same as NST.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "O" ring between the threaded sleeve and PVC head.

Dry hydrant cap. The cap shall be a snap-on/snap-off design and removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of same metal as NST connection for maximum corrosion resistance.

Strainer. The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8-inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion resistant. Screens and strainers shall have a minimum open area of 4 times the pipe cross sectional area. Where the intake is more than 3 feet off the bottom, a trash rack may be used in place of a screen.

A strainer may be formed by drilling 3/8 inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Drill holes shall be deburred and the pipe cleaned before putting the strainer into

service. The screens or strainers shall be capped with a removable end cap.

End cap. The end cap must be easily removed without special tools. Perforations are recommended in the end cap to improve flow conditions into the strainer and for jetting action for silt cleanout.

Materials. All materials shall meet or exceed the minimum requirements for materials described in the various sections of this standard.

Access. Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained, and be at least 12 feet wide for ease of movement by personnel and equipment during an emergency. When local road traffic may be involved, an all-weather road surface conforming to Missouri Conservation Practice Standard (560) Access Road adjacent to the dry hydrant and completely off the public road is recommended for safety of the emergency personnel and the public.

Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion. Vegetation shall be in accordance with Conservation Practice (342) Critical Area Planting.

CONSIDERATIONS

1. Any work in and/or around streams or water-bodies may require a permit from the US Army Corps of Engineers, State Water Quality (Permitting) Authority, or local authority.

2. Consider other water usage or losses from the water source such as livestock water, irrigation, and seepage rates.

3. Effect of the use of the dry hydrant on upstream and downstream water quantity.

4. Sediment production caused by erosion during construction.

5. Possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.

PLANS AND SPECIFICATIONS

Plans and specifications for installing dry hydrants shall be in keeping with this

standard and shall describe the requirements for applying the practice to achieve its intended purpose. Missouri standard drawing 29-N-403 and Missouri

Construction Specification Dry Hydrant (432) are compatible with this standard. Required permits shall be obtained prior to initiating any work.

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OPERATION AND MAINTENANCE

The Operation and Maintenance (O&M) plan shall specify that the treatment areas and associated practices be inspected annually and after significant storm events to identify repair and maintenance needs.

The O&M plan shall detail the level of repairs needed to maintain the effectiveness and useful life of the practice.

NATURAL RESOURCES CONSERVATION SERVICE
MISSOURI OPERATION AND MAINTENANCE AND TESTING

FOR

DRY HYDRANT

(432)

Operation and Maintenance

The operation and maintenance plan for the system is the responsibility of the local fire department and the landowner. The dry hydrant should be checked at least one time each year. Some of the items that need to be addressed are:

1. Check access road to ensure it is in usable condition. Repair road as needed.

2. Mow the dry hydrant access area to keep the area readily available for use. Any brush that is in the way shall be removed.

3. Check for vandalism and normal wear and deterioration. Repair any damage that would prevent the system from working. Paint exposed parts of the hydrant as needed.

4. Inspect the site for any item that would affect safety.

Testing

Pumper testing of the dry hydrant shall be done at least annually to verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Careful attention should be given to silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant.

In-water checks of the intake screen should be made every five years or sooner to identify sediment build up, aquatic growth, or other obstructions. The hydrant should be back flushed each year to remove any silt or debris that may have accumulated on the screen.

Additional details: _____

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NATURAL RESOURCES CONSERVATION SERVICE
MISSOURI CONSTRUCTION SPECIFICATION

FOR

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General

Construction operations shall be carried out in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used. At no time shall anyone be allowed into or close to the open trench. The contractor shall be assured that all state laws concerning buried utilities are met prior to beginning work.

Materials

Materials and fabrication shall be as specified on Missouri Standard Drawing 29-N-403 or equivalent. Plastic pipe 6 inches in diameter meeting ASTM specifications D1785, D2241, or AWWA specification C900 will be used. Pipe shall be equivalent in strength to Schedule 40 or heavier. The ASTM or AWWA designation shall be stamped on the pipe. Joints shall be made in a manner as recommended by the manufacturer to provide a watertight connection.

Steel pipe conforming to ASTM A53 standard weight may also be used. The joints shall be welded and strapped to provide a watertight connection. Elbows and fittings shall be compatible to the pipe.

Placement

Dry hydrants should be placed on suitable subgrade material. The area surrounding he hydrant shall be graded to permit free drainage of surface water.

Placement of the hydrant shall be as shown on the drawings or as staked. The pipe shall be free of dirt and other materials before assembling.

Hydrants shall be placed so that they are protected against hazards imposed by traffic, farm operations, freezing temperatures, or soil cracking. Minimum depth of burial shall be as shown on the drawings. The hydrant should be buried below frost line or otherwise protected from freezing.

Trenches for plastic pipelines shall be free of rocks and other sharp edged materials, and pipe shall be carefully placed to prevent damage.

All PVC pipe connections, designed to be glued, will have cleaner and PVC solvent cement used in accordance with manufacturer's recommendations. Allow glue to cure thoroughly prior to moving pipe assembly. **Gluing shall not be done at temperatures below freezing**.

Backfilling

All backfilling shall be completed before the hydrant is placed in service. The initial backfill shall be of selected material that is free from rocks or other sharp edged material that can damage the pipe. Backfill shall be mounded above ground line to allow for settlement.

Vegetation

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Topsoil shall be added, if needed, to establish vegetation. Refer to JS-AGRON-25 or equivalent for seeding and mulching recommendations.

Additional details:

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